UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2004/00103 (North Coast)
2004/00343 (Svensen Island)

July 27, 2004

Mr. Lawrence C. Evans
Portland District, Corps of Engineers
CENWP-OP-GP (Ms. Karla Ellis)
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation, Conference, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the North Coast Watershed Association and the Svensen Island District Improvement Company Tide Gate Replacements and Levee Repair, Columbia River Basin, Clatsop County, Oregon (Corps Nos. 200300749 and 200400090)

Dear Mr. Evans:

Enclosed is a biological opinion (Opinion) prepared by the National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of issuance of a permit for the proposed North Coast Watershed Association and the Svensen Island District Improvement Company tide gate replacements and levee repair in Clatsop County, Oregon. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of thirteen species of ESA-listed or proposed salmonid fishes, Snake River (SR) fall-run Chinook salmon, SR spring/summer-run Chinook salmon, SR sockeye salmon, SR steelhead, Lower Columbia River (LCR) Chinook salmon, Upper Columbia River (UCR) spring-run Chinook salmon, Upper Willamette River (UWR) Chinook salmon, Columbia River chum salmon, Middle Columbia River steelhead, LCR steelhead, UWR steelhead, UCR steelhead, and LCR coho salmon, or destroy or adversely modify their designated critical habitat. As required by section 7 of the ESA, NOAA Fisheries included reasonable and prudent measures with non-discretionary terms and conditions that are necessary to minimize the effects of incidental take associated with this action.

This document also serves as consultation on essential fish habitat pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations (50 CFR Part 600). NOAA Fisheries concluded that the proposed action may adversely affect designated EFH for Pacific salmon, groundfish and coastal pelagic species. As required by section 305(b)(4)(A) of the MSA, included are conservation recommendations that NOAA Fisheries believes will avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from the proposed action. As described in the enclosed consultation, 305(b)(4)(B) of the MSA requires that a Federal action agency must provide a detailed response in writing within 30 days after receiving an EFH conservation recommendation.

Please direct any questions regarding this consultation to Robert Anderson of my staff in the Lower Columbia River/Oregon Coast Habitat Branch of the Oregon State Habitat Office at 503.231.2226.

Sincerely,

Russell M Strach for

D. Robert Lohn
Regional Administrator

Endangered Species Act - Section 7 Consultation
Biological and Conference Opinion

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Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

North Coast Watershed Association and the Svensen Island District Improvement Company
Tide Gate Replacements and Levee Repair
Columbia River Basin, Clatsop County, Oregon
(Corps Nos. 200300749 and 200400090)

Agency: U.S. Army Corps of Engineers

Consultation Conducted By: NOAA's National Marine Fisheries Service, Northwest Region

Date Issued: July 27, 2004

Russell M Strach for

Issued by: ________________
D. Robert Lohn
Regional Administrator

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1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with U.S. Fish and Wildlife Service and NOAA's National Marine Fisheries Service (NOAA Fisheries), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations found at 50 CFR 402.

The analysis also fulfills the essential fish habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).

1.1 Background and Consultation History

On February 4, 2003, and March 24, 2004, NOAA Fisheries received letters from the U.S. Army Corps of Engineers (Corps) requesting formal consultation pursuant to section 7(a)(2) of the ESA, and EFH consultation pursuant to section 305(b)(2) of the MSA for the issuance of a permit for North Coast Watershed Association and the Svensen Island District Improvement Company tide gate replacements and levee repair, Clatsop County, Oregon. For the North Coast Watershed Association tide gate replacements, no biological assessment (BA) was submitted with the letter. For the Svensen Island District Improvement Company tide gate replacement and dike repair, a BA describing the proposed action and its potential effects was submitted with the letter. In the letters, the Corps determined the proposed actions were likely to adversely affect the following ESA-listed species: Snake River (SR) steelhead (*Oncorhynchus mykiss*), Upper Columbia River (UCR) steelhead, Middle Columbia River (MCR) steelhead, Upper Willamette River (UWR) steelhead, Lower Columbia River (LCR) steelhead, SR spring/summer-run Chinook salmon (*O. tshawytscha*), SR fall-run Chinook salmon, UCR spring-run Chinook salmon, UWR Chinook salmon, LCR Chinook salmon, Columbia River (CR) chum salmon (*O. keta*),SR sockeye salmon (*O. nerka*), and LCR coho salmon (*O. kisutch*) (proposed for listing), and designated critical habitat for SR spring/summer Chinook salmon, SR fall-run Chinook salmon, SR sockeye salmon. The Corps also found the proposed actions may adversely affect designated EFH.

1.2 Proposed Action

The proposed action is issuance of permits by the Corps under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act to the North Coast Watershed Association and the Svensen Island District Improvement Company to replace a total of four tide gates, and relocate and repair an 80-foot section of levee. Specific elements of the proposed action are described below.

1.2.1 Tide Gates

1.2.1.1 Elliot Slough

The North Coast Watershed Association is proposing to replace the existing 80-foot long by 4-foot wide culvert and tide gate with a new 80-foot long by 5-foot wide culvert with a tide gate installed in the levee at the confluence of Elliot Slough and the Woallooskee River. The new culvert and tide gate would be placed in the same footprint as the existing structure. The tide gate would be top-hinged with a slider door. Culvert invert elevation would be set at 0 feet mean low lower water (MLLW). Approximately 10 cubic yards of rip rap would be placed at the toe of the culvert. Two untreated wood piles would be installed beside the culvert outlet to secure the culvert from shifting due to tidal hydraulics. All in-water work would occur during the Oregon Department of Fish and Wildlife (ODFW)-recommended in-water work window of July 1 to September 15.

1.2.1.2 Larson Slough

The North Coast Watershed Association is proposing to replace the existing 80-foot long by 4-foot wide culvert and tide gate with a new 80-foot long by 5-foot wide culvert with a tide gate installed in the levee at the confluence of Larson Slough and the Lewis and Clark River. The tide gate would be top-hinged with a slider door. Culvert invert elevation would be set at 0 feet MLLW. Approximately 10 cubic yards of rip rap would be placed at the toe of the culvert. Two untreated wood piles would be installed beside the culvert outlet to secure the culvert from shifting due to tidal hydraulics. All in-water work would occur during the ODFW-recommended in-water work window of July 1 to September 15.

1.2.1.3 Barrett Slough

The North Coast Watershed Association is proposing to replace the existing 80-foot long by 4-foot wide tide gate with a new 80-foot long by 5-foot wide culvert with a tide gate installed in the levee at the confluence of Barrett Slough and the Lewis and Clark River. The tide gate would be top-hinged with a slider door. The new culvert and tide gate would be placed in the same footprint as the existing structure. Culvert invert elevation would be set at 0 feet MLLW. All in-water work would occur during the ODFW-recommended in-water work window of July 1 to September 15.

1.2.1.4 Svensen Island

The Svensen Island District Improvement Company is proposing to replace the existing tide gate (specifications not provided) with a new 100-foot long culvert with a tide gate (specifications not provided) installed in the levee at the confluence of an agricultural drainage ditch and a man-made conveyance ditch that exports agricultural runoff into the Columbia River. The Corps proposed to conduct all in-water work between July 15 to September 15. The ODFW-recommended in-water work window is November 1 through February 28.

1.2.2 Levee Repair

The Svensen Island District Improvement Company proposes to repair a 160-foot long by 80-foot wide section of levee. The proposed relocation of the levee section would be approximately 150 to 200 feet landward of the original levee footprint. The offset levee would be constructed of materials available on-site, *e.g.*, soil and rip rap. The relocation of the new levee section would require the clearing of approximately 13,000 square feet of unspecified vegetation. The Corps proposed to conduct all in-water work between July 15 to September 15. The ODFW-recommended in-water work window is November 1 through February 28. The proposal would require 1400 cubic yards of fill. The applicant requested NOAA Fisheries provide tide gate specifications for design and operations.

1.2.3 Conservation Measures

NOAA Fisheries regards the conservation measures included in the consultation requests as useful and important to minimize adverse effects to ESA-listed species and their habitats, and considers them to be an integral part of the proposed actions. Conservation measures in the following categories would apply (see consultation proposals for details): (1) Site rehabilitation, (2) in-water work timing and tide elevation restrictions, (3) heavy equipment operations, (4) refueling, (5), spill containment and control, (6) fish passage, and (7) sediment and erosion control.

1.3 Description of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area (project area) involved in the proposed action (50 CFR 402.02). Effects at the project sites may extend upstream or downstream base on the potential for impairing fish passage, injury to or killing of listed salmon and steelhead, fish passage barriers (tide gates), placement of rip rap, and temporary increases in suspended sediments and turbidity. For the North Coast Watershed Association proposals, NOAA Fisheries defines the action area as all aquatic habitats accessible to the subject species in Elliot Slough, Larson Slough, and Barrett Slough, the adjacent riparian zone, and an area measuring 300 feet downstream from the subject sloughs and the Woallooskee River, the Lewis and Clark River, respectively. For the Svensen Island District Improvement Company proposal, NOAA Fisheries defines the action area all aquatic habitats accessible to the subject species in the agricultural drainage ditch, the man-made conveyance ditch that connects to the Columbia River, and the adjacent riparian zone exclusive to the Township 8 North, Range 8 West, section 15.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

This consultation considers the potential effects of the proposed action by the Corps on SR steelhead, UCR steelhead, MCR steelhead, UWR steelhead, LCR steelhead, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, UCR spring-run Chinook salmon, UWR Chinook salmon, LCR Chinook salmon, CR chum salmon, and SR sockeye salmon. Species' listing dates, critical habitat designations, and take prohibitions are listed in Table 1. The objective of this consultation is to determine whether the proposed action is likely to jeopardize the continued existence of the ESA-listed species, or destroy or adversely modify designated critical habitat for, SR fall Chinook, SR spring/summer Chinook salmon, or SR sockeye salmon. This consultation is conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations (50 CFR 402).

2.1.1 Biological Information and Critical Habitat

SR Spring/Summer Chinook Salmon

It is estimated that at least 1.5 million spring/summer Chinook salmon returned to the Snake River in the late 1800s, approximately 39 to 44% of all spring/summer Chinook in the Columbia River basin. Historically, Shoshone Falls (RM 615) was the uppermost limit to spring/summer Chinook migration, and spawning occurred in virtually all suitable and accessible habitat in the Snake River basin (Fulton 1968 and Matthews and Waples 1991). The development of mainstem irrigation and hydroelectric projects in the mainstem Snake River basin have significantly reduced the amount of habitat available for spring/summer Chinook such that between 1950 and 1960, an average of 125,000 adults returned to the Snake River, only 8% of the historic estimate. An estimated average of 100,000 wild adults would have returned from 1964 to 1968 each year after adjusting for fish harvested in the river fisheries below McNary Dam. However, actual counts of wild adults at Ice Harbor Dam annually averaged only 59,000 each year from 1962 to 1970. The estimated number of wild adult Chinook salmon passing Lower Granite Dam between 1980 and 1990 was 9,674 fish (Matthews and Waples 1991). A recent 5-year geometric mean (1992 to 1996) was only 3,820 naturally-produced spawners (Myers *et al.* 1998). This is less than 0.3% of the estimated historical abundance of wild SR spring/summer Chinook.

SR spring/summer Chinook migrate through the Columbia River from March through July, and spawn in smaller, higher elevation streams than do fall Chinook. Fry generally emerge from the gravel between February and June. SR spring/summer Chinook exhibit a "stream" type juvenile life history pattern, rearing for one, or sometimes even two years in freshwater before migrating to the ocean from April through June. These smolts are often referred to "yearling" Chinook.

Adults typically remain in the ocean for two or three years before returning to spawn (Matthews and Waples 1991).

Table 1. Endangered and threatened pacific salmon and steelhead under NOAA Fisheries' jurisdiction in the Columbia River Basin. Federal Register Notices for Final Rules that list species, designate critical habitat, or apply protective regulations to ESUs considered in this consultation. (Listing status 'T' means listed as threatened, 'E' means listed as endangered, and 'P' means proposed for listing).

Species ESU	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (*Oncorhynchus tshawytscha*)			
Lower Columbia River	T 3/24/99; 64 FR 14308	Not applicable	7/10/00; 65 FR 42422
Upper Willamette River	T 3/24/99; 64 FR 14308	Not applicable	7/10/00; 65 FR 42422
Upper Columbia River spring-run	E 3/27/99; 64 FR 14308	Not applicable	ESA section 9 applies
Snake River spring / summer run	T 4/22/92; 57 FR 14653	10/25/99; 64 FR 57399	7/10/00; 65 FR 42422
Snake River fall-run	T 6/3/92; 57 FR 23458	12/28/93; 58 FR 68543	7/10/00; 65 FR 42422
Chum salmon (*O. keta*)			
Columbia River	T 3/25/99; 64 FR 14508	Not applicable	7/10/00; 65 FR 42422
Coho salmon (*O. kisutch*)			
Lower Columbia River	P 6/14/04; 69 FR 33102	Not applicable	Not applicable
Sockeye salmon (*O. nerka*)			
Snake River	E 11/20/91; 56 FR 58619	12/28/93; 58 FR 68543	ESA section 9 applies
Steelhead (*O. mykiss*)			
Lower Columbia River	T 3/19/98; 63 FR 13347	Not applicable	7/10/00; 65 FR 42422
Upper Willamette River	T 3/25/99; 64 FR 14517	Not applicable	7/10/00; 65 FR 42422
Middle Columbia River	T 3/25/99; 64 FR 14517	Not applicable	7/10/00; 65 FR 42422
Upper Columbia River	E 8/18/97; 62 FR 43937	Not applicable	ESA section 9 applies
Snake River Basin	T 8/18/97; 62 FR 43937	Not applicable	7/10/00; 65 FR 42422

SR Fall Chinook Salmon

The SR fall Chinook salmon evolutionarily significant unit (ESU) once spawned in the mainstem of the Snake River, from its confluence with the Columbia River upstream to Shoshone Falls (RM 615). The spawning grounds between Huntington (RM 328) and Auger Falls (RM 607) were historically the most important for this species. Only limited spawning activity occurred downstream from RM 273 (Waples *et al.* 1991a), about one mile below Oxbow Dam (Waples *et al.* 1991a). However, irrigation and hydropower projects on the mainstem Snake River have inundated, or blocked access to most of this area in the past century. The construction of Swan Falls Dam (RM 458) in 1901 eliminated access to much of this habitat and the completion of Brownlee Dam in 1958 (RM 285), Oxbow Dam in 1961 (RM 272), and Hells Canyon Dam in 1967 (RM 247) blocked access to the rest.

Since 1991, spawning has been limited primarily to the mainstem Snake River between a point upstream of Lower Granite Reservoir (RM 149) and Hells Canyon Dam (RM 247), and the lower reaches of the Grande Ronde, Clearwater, and Tucannon Rivers, tributaries to the Snake River. Redds in the Clearwater River have been observed from its mouth to slightly upstream of its confluence with the north fork (about 40 miles).

No reliable estimates of historical abundance are available (Waples *et al.* 1991b), but because of their dependence on mainstem habitat for spawning, fall Chinook have probably been affected to a greater extent by irrigation and hydroelectric projects than any other species of salmon in the Snake River basin. The mean number of adult SR fall Chinook salmon declined from 72,000 in the 1930s and 1940s to 29,000 during the 1950s. In spite of this, the Snake River remained the most important natural production area for fall Chinook in the Columbia River basin through the 1950s. The number of adults counted at the uppermost Snake River mainstem dams averaged 12,720 total spawners from 1964 to 1968; 3,416 spawners from 1969 to 1974; and 610 spawners from 1975 to 1980 (Waples, *et al.* 1991b). Most adult SR fall Chinook spend three years at sea before migrating up the Columbia and Snake Rivers between August and October (Waples *et al.* 1991b). Spawning occurs in the mainstem Snake River and in the lower parts of its major tributaries in between late October and mid-December, typically peaking in November (Myers *et al.* 1998). Fry emerge from the spawning beds from late March through early June. At present, the peak of the smolt outmigration usually occurs in July, however juvenile fall Chinook may be found migrating in the lower Snake and Columbia rivers from May through October.[1] SR fall Chinook typically exhibit an "ocean" type juvenile life history pattern, usually rearing in freshwater for only a few months before migrating to the ocean.

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[1] In its comments on the draft USBR 1999 Biological Opinion, the State of Idaho commented that "it is generally accepted that peak juvenile Snake River fall Chinook migration historically coincided with the declining hydrograph following spring snowmelt" (Kempthorne 1999). However, Krzma and Raleigh (1970) observed that the migration of juvenile fall Chinook into Brownlee Reservoir in 1962 and 1963 began in mid-April, and ended by mid-June (roughly 75% of the migration took place during the second and third weeks of May in those years). Juvenile fall Chinook captured between mid-May and mid-June averaged 71, 81, and 79 millimeters in 1962, 1963, and 1964, respectively. Similarly, Mains and Smith (1964), who monitored the migration of Chinook salmon in the lower Snake River (RM 82) in 1954 and 1955, collected Chinook salmon fry (most likely those of fall Chinook salmon) migrating in March and April, and documented that the migration of Chinook salmon smolts was nearly complete by the end of June. The average length of fingerlings in June was 90.7 mm. Thus, the historic migration of fall Chinook salmon through the Snake River was more likely to have occurred between late-May and late-June, nearer the peak of historical hydrograph.

SR Sockeye Salmon

Before the turn of the century (c. 1880), about 150,000 sockeye salmon ascended the Wallowa, Payette, and Salmon River basins to spawn in natural lakes (Evermann 1895). Sockeye populations in the Payette basin lakes were eliminated after a diversion dam near Horseshoe Bend was constructed in 1914, and Black Canyon Dam was completed in 1924. In 1916, a dam at Wallowa Lake was increased in height, resulting in the extinction of indigenous sockeye in Wallowa Lake. Sockeye salmon in the Salmon River occurred historically in at least four lakes within Idaho's Stanley basin: Alturas, Redfish, Pettit, and Stanley Lakes. Sunbeam Dam, 20 miles downstream from Redfish Lake, severely limited sockeye and other anadromous salmonid production in the upper Salmon River between 1910 to 1934 (Waples *et al.* 1991a). In the 1950s and 1960s, more than 4,000 adults returned annually to Redfish Lake. Between 1985 and 1987, an average of 13 sockeye were counted at the Redfish Lake weir. Only 10 sockeye have returned to Redfish Lake since 1994: One in 1994, one in 1996, one in 1998 and seven in 1999 (all of those returning in 1999 were 2nd generation progeny of wild sockeye that returned to Idaho in 1993). Since 1991, adult sockeye returning to Redfish Lake have been captured to support a captive broodstock program.

Historically, SR sockeye salmon adults entered the Columbia River in June and July, migrated upstream through the Snake and Salmon Rivers, and arrived at Redfish Lake in August and September. Spawning peaks in October and occurs in lakeshore gravels. Fry emerge in late April and May and move immediately to the open waters of the lake where they feed on plankton for one to three years before migrating to the ocean. Juvenile sockeye generally leave Redfish Lake from late April through May, and migrate nearly 900 miles to the Pacific Ocean. Although pre-dam reports indicate that sockeye salmon smolts migrated in May and June, tagged sockeye smolts from Redfish Lake passed Lower Granite Dam from mid-May to mid-July. SR sockeye spend 2 to 3 years in the Pacific Ocean before returning to their natal lake to spawn.

SR Steelhead

Historically, SR steelhead spawned in virtually all accessible habitat in the Snake River up to Shoshone Falls (RM 615). The development of irrigation and hydropower projects on the mainstem Snake River have significantly reduced the amount of available habitat for this species. No valid historical estimates of adult steelhead returning to the Snake River basin before the completion of Ice Harbor Dam in 1962 are available. However, SR steelhead sportfishing catches ranged from 20,000 to 55,000 fish during the 1960s (Fulton 1970). The run of steelhead was likely several times as large as the sportfish take. Between 1949 and 1971, adult steelhead counts at Lewiston Dam (on the Clearwater River) averaged about 40,000 per year. The count at Ice Harbor Dam in 1962 was 108,000 and averaged approximately 70,000 per year between 1963 and 1970.

A recent 5-year geometric mean (1990 to 1994) for escapement above Lower Granite Dam was approximately 71,000. However, the wild component of this run was only 9,400 adults (7,000 A-run and 2,400 B-run). In recent years average densities of wild juvenile steelhead have decreased significantly for both A-run and B-run steelhead. Many basins within the Snake River are significantly under-seeded relative to the carrying capacity of streams (Busby *et al.* 1996).

Steelhead populations exhibit both anadromous (steelhead) and freshwater resident (rainbow or red-band trout) forms. Unlike other Pacific salmon species, steelhead are capable of spawning on more than one occasion, returning to the ocean to feed between spawning events. SR steelhead rarely return to spawn a second time. Steelhead can be classified into two reproductive types: Stream-maturing steelhead, which enter fresh water in a sexually immature condition and wait several months before spawning; and ocean-maturing steelhead, which return to freshwater with fully-developed gonads and spawn shortly thereafter. In the Pacific Northwest, stream-maturing steelhead enter fresh water between May and October and are referred to as "summer" steelhead. In comparison, ocean-maturing steelhead return between November and April and are considered "winter" steelhead. Inland steelhead populations in the Columbia River basin are almost exclusively of the summer variety (Busby *et al.* 1996).

SR steelhead can be further divided into two groupings: A-run steelhead and B-run steelhead. This dichotomy reflects the bimodal migration of adult steelhead observed at Bonneville Dam. A-run steelhead generally return to fresh water between June and August after spending 1 year in the ocean. These fish are typically less than 77.5 centimeters (cm) in length. B-run steelhead usually return to fresh water from late August to October after spending 2 years in the ocean and are generally greater than 77.5 cm in length.

Both A-run and B-run spawn the following spring from March to May in small to mid-sized streams. The fry emerge in 7 to 10 weeks, depending on temperature, and usually spend 2 or 3 years in fresh water before migrating to the ocean from April to mid-June. These estimates are based on population averages and steelhead are capable of remarkable plasticity with in their life cycles.

<u>LCR Chinook Salmon</u>
The LCR Chinook salmon ESU includes all native populations from the mouth of the Columbia River to the crest of the Cascade Range, excluding populations above Willamette Falls. The former location of Celilo Falls (inundated by The Dalles reservoir in 1960) is the eastern boundary for this ESU. Stream-type, spring-run Chinook salmon found in the Klickitat River, or the introduced Carson spring-run Chinook salmon strain, are not included in this ESU. Spring-run Chinook salmon in the Sandy River have been influenced by spring-run Chinook salmon introduced from the Willamette River ESU. However, analyses suggest that considerable genetic resources still reside in the existing population (Myers *et al.* 1998). Recent escapements above Marmot Dam on the Sandy River average 2,800 and have been increasing (ODFW 1998).

Historical records of Chinook salmon abundance are sparse, but cannery records suggest a peak run of 4.6 million fish in 1883. Although fall-run Chinook salmon are still present throughout much of their historical range, most of the fish spawning today are first-generation hatchery strays. Furthermore, spring-run populations have been severely depleted throughout the ESU and extirpated from several rivers.

Apart from the relatively large and apparently healthy fall-run population in the Lewis River, production in this ESU appears to be predominantly hatchery-driven with few identifiable naturally-spawned populations. All basins are affected (to varying degrees) by habitat degradation. Hatchery programs have had a negative effect on the native ESU. Efforts to enhance Chinook salmon fisheries abundance in the lower Columbia River began in the 1870s. Available evidence indicates a pervasive influence of hatchery fish on natural populations throughout this ESU, including both spring- and fall-run populations. The large number of hatchery fish in this ESU make it difficult to determine the proportion of naturally-produced fish. The loss of fitness and diversity within the ESU is an important concern. The median population growth rate over a base period from 1980 through 1998 ranged from 0.98 to 0.88, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared with that of fish of wild origin (McClure *et al.* 2000).

<u>UCR Spring Chinook Salmon</u>
The UCR ESU includes spring-run Chinook populations found in Columbia River tributaries between Rock Island and Chief Joseph Dams, notably the Wenatchee, Entiat, and Methow River basins. The populations are genetically and ecologically separate from the summer- and fall-run populations in the lower parts of many of the same river systems (Myers *et al.* 1998). Although fish in this ESU are genetically similar to spring Chinook in adjacent ESUs, they are distinguished by ecological differences in spawning and rearing habitat preferences. For example, spring-run Chinook in upper Columbia River tributaries spawn at lower elevations (500 to 1,000 m) than in the Snake and John Day River systems.

The UCR populations were intermixed during the Grand Coulee Fish Maintenance Project (1939 through 1943), resulting in loss of genetic diversity between populations in the ESU. Homogenization remains an important feature of the ESU. Fish abundance has tended downward both recently and over the long term. At least six former populations from this ESU are now extinct, and nearly all extant populations have fewer than 100 wild spawners.

Given the lack of information on Chinook salmon stocks that are presumed to be extinct, the relationship of these stocks to existing ESUs is uncertain. Recent total abundance within this ESU is quite low, and escapements in 1994 to 1996 were the lowest in at least 60 years. At least six populations of spring Chinook salmon in this ESU have become extinct, and almost all remaining naturally-spawning populations have fewer than 100 spawners. Extinction risks for UCR spring Chinook salmon are 50% for the Methow, 98% for the Wenatchee, and 99% for the Entiat spawning populations (Cooney 2002). In 2002, the spring Chinook count at Priest Rapids Dam was 34,083, with 24,000 arriving at Rock Island Dam. The 2002 count was about 67.6% and 242% of the respective 2001 and 10-year average adult spring Chinook count at Priest Rapids Dam.

<u>UWR Chinook Salmon</u>
The UWR Chinook salmon ESU includes native spring-run populations above Willamette Falls and in the Clackamas River. In the past, it included sizable numbers of spawning salmon in the Santiam River, the middle fork of the Willamette River, and the McKenzie River, as well as smaller numbers in the Molalla River, Calapooia River, and Albiqua Creek. Although the total number of fish returning to the Willamette has been relatively high (24,000), about 4,000 fish

now spawn naturally in the ESU, two-thirds of which originate in hatcheries. The McKenzie River supports the only remaining naturally-reproducing population in the ESU (ODFW 1998).

There are no direct estimates of the size of the Chinook salmon runs in the Willamette River basin before the 1940s. The Native American fishery at the Willamette Falls may have yielded 908,000 kilograms of salmon (454,000 fish, each weighing 9.08 kg) (McKernan and Mattson 1950). Egg collections at salmon hatcheries indicate that the spring Chinook salmon run in the 1920s may have been five times the run size of 55,000 fish in 1947, or 275,000 fish (Mattson 1948). Much of the early information on salmon runs in the upper Willamette River basin comes from operation reports of state and Federal hatcheries.

Fish in this ESU are distinct from those of adjacent ESUs in life history and marine distribution. The life history of Chinook salmon in the UWR ESU includes traits from both ocean- and stream-type development strategies. Tag recoveries indicate that the fish travel to the marine waters off British Columbia and Alaska. More Willamette fish are recovered in Alaskan waters than fish from the LCR ESU. UWR Chinook salmon mature in their fourth or fifth years. Historically, 5-year-old fish dominated the spawning migration runs, however, recently most fish have matured at age 4. The timing of the spawning migration is limited by Willamette Falls. High flows in the spring allow access to the upper Willamette River basin, whereas low flows in the summer and autumn prevent later-migrating fish from ascending the falls. The low flows may serve as an isolating mechanism, separating this ESU from others nearby.

While the abundance of UWR spring Chinook salmon has been relatively stable over the long term and there is evidence of some natural production, at present natural production and harvest levels the natural population is not replacing itself. With natural production accounting for only one-third of the natural spawning escapement, natural spawners may not be capable of replacing themselves even in the absence of fisheries. The introduction of fall-run Chinook into the basin and the laddering of Willamette Falls have increased the potential for genetic introgression between wild spring- and hatchery fall-run Chinook. Habitat blockage and degradation are significant problems in this ESU.

The median population growth rate over a base period from 1980 through 1998 ranges from 1.01 to 0.63, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared with that of fish of wild origin (McClure *et al.* 2000).

<u>CR Chum Salmon</u>
Chum salmon of the CR ESU spawn in tributaries and in mainstem areas below Bonneville Dam. Most fish spawn on the Washington side of the Columbia River (Johnson *et al.* 1997). Previously, chum salmon were reported in almost every river in the lower Columbia River basin, but most runs disappeared by the 1950s (Rich 1942, Marr 1943, Fulton 1970). WDFW regularly monitors only a few natural populations in the basin, one in Grays River, two in small streams near Bonneville Dam, and the mainstem area next to one of the latter two streams. Recently, spawning has occurred in the mainstem Columbia River at two spots near Vancouver, Washington, and in Duncan Creek below the Bonneville Dam.

Historically, the CR chum salmon ESU supported a large commercial fishery in the first half of this century, landing more than 500,000 fish per year as recently as 1942. Commercial catches declined beginning in the mid-1950s, and in later years rarely exceeded 2,000 per year. There are now no recreational or directed commercial fisheries for chum salmon in the Columbia River, although chum salmon are taken incidentally in the gill-net fisheries for coho and Chinook salmon, and some tributaries have a minor recreational harvest (WDF *et al.* 1993). Observations of chum salmon still occur in most of the 13 basins/areas that were identified in 1951 as hosting chum salmon, however, fewer than 10 fish are usually observed in these areas. In 1999, the WDFW found another Columbia River mainstem spawning area for chum salmon near the I-205 bridge (WDFW 2000).

Chum salmon enter the Columbia River from mid-October through early December and spawn from early November to late December. Recent genetic analysis of fish from Hardy and Hamilton Creeks and from the Grays River indicate that these fish are genetically distinct from other chum salmon populations in Washington. Genetic variability within and between populations in several geographic areas is similar, and populations in Washington show levels of genetic subdivision typical of those seen between summer- and fall-run populations in other areas, and are typical of populations within run types (Salo 1991, WDF *et al.* 1993, Phelps *et al.* 1994, Johnson *et al.* 1997).

The median population growth rate is 1.04 over a base period from 1980 through 1998 for the ESU as a whole (McClure *et al.* 2000). Because census data are peak counts (and because the precision of those counts decreases markedly during the spawning season as water levels and turbidity rise), NOAA Fisheries is unable to estimate the risk of absolute extinction for this ESU.

<u>MCR Steelhead</u>
The MCR ESU occupies the Columbia River basin from above the Wind River in Washington and the Hood River in Oregon and continues upstream to include the Yakima River, Washington. The region includes some of the driest areas of the Pacific Northwest, generally receiving less than 40 cm of precipitation annually (Jackson 1993). Summer steelhead are widespread throughout the ESU; winter steelhead occur in Mosier, Chenowith, Mill, and Fifteenmile Creeks in Oregon, and in the Klickitat and White Salmon Rivers in Washington. The John Day River probably represents the largest native, natural spawning stock of steelhead in the region.

Estimates of historical (pre-1960s) abundance specific to this ESU are available for the Yakima River, which has an estimated run size of 100,000 (WDF *et al.* 1993). Assuming comparable run sizes for other drainage areas in this ESU, the total historical run size may have exceeded 300,000 steelhead (NOAA 2000a).

Most fish in this ESU smolt at two years and spend 1 to 2 years in salt water before re-entering freshwater, where they may remain up to a year before spawning (Howell *et al.* 1985). All steelhead upstream of The Dalles Dam are summer-run (Schreck *et al.* 1986, Reisenbichler *et al.* 1992, Chapman *et al.* 1994, Busby *et al.* 1996). The Klickitat River, however, produces both summer and winter steelhead, and age-2-ocean steelhead dominate the summer steelhead, whereas most other rivers in the region produce about equal numbers of both age 1- and 2-ocean fish. A non-anadromous form co-occurs with the anadromous form in this ESU, and information suggests that the two forms may not be isolated reproductively, except where barriers are involved.

Current population sizes are substantially lower than historic levels, especially in the rivers with the largest steelhead runs in the ESU, the John Day, Deschutes, and Yakima Rivers. At least two extinctions of native steelhead runs in the ESU have occurred (the Crooked and Metolius Rivers, both in the Deschutes River basin). For the MCR steelhead ESU as a whole, (NOAA 2000a) estimates that the median population growth rate over the base period (1990-1998) ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared with that of fish of wild origin (McClure *et al.* 2000). In 2002, the count of Bonneville Dam steelhead totaled 481,036 and exceeded all counts recorded at Bonneville Dam since 1938, except the 2001 total, which was 633,464. Of the total return in 2002, 143,032 were considered wild steelhead (Fish Passage Center 2003).

<u>LCR Steelhead</u>

The LCR ESU encompasses all steelhead runs in tributaries between the Cowlitz and Wind Rivers on the Washington side of the Columbia, and the Willamette and Hood Rivers on the Oregon side. The populations of steelhead that make up the LCR steelhead ESU are distinguished from adjacent populations by genetic and habitat characteristics. The ESU consists of summer and winter coastal steelhead runs in the tributaries of the Columbia River as it cuts through the Cascades. These populations are genetically distinct from inland populations (east of the Cascades), as well as from steelhead populations in the upper Willamette River basin and coastal runs north and south of the Columbia River mouth. Not included in the ESU are runs in the Willamette River above Willamette Falls (Upper Willamette River ESU), runs in the Little and Big White Salmon Rivers (Middle Columbia River ESU), and runs based on four imported hatchery stocks: Early-spawning winter Chambers Creek/lower Columbia River mix, summer Skamania Hatchery stock, winter Eagle Creek NFH stock, and winter Clackamas River ODFW stock (63 FR 13351 and 13352). This area has at least 36 distinct runs (Busby *et al.* 1996), 20 of which were identified in the initial listing petition. In addition, numerous small tributaries have historical reports of fish, but no current abundance data. The major runs in the ESU, for which there are estimates of run size, are the Cowlitz River winter runs, Toutle River winter runs, Kalama River winter and summer runs, Lewis River winter and summer runs, Washougal River winter and summer runs, Wind River summer runs, Clackamas River winter and summer runs, Sandy River winter and summer runs, and Hood River winter and summer runs (NOAA 2000a).

All runs in the LCR steelhead ESU have declined from 1980 to 2000, with sharp declines beginning in 1995 (NOAA Fisheries 2000a). Historic counts in some of the larger tributaries (Cowlitz, Kalama, and Sandy Rivers) probably exceeded 20,000 fish; more recent counts have been in the range of 1,000 to 2,000 fish (NOAA 2000a). Habitat loss, hatchery steelhead introgression, and harvest are the major contributors to the decline of steelhead in this ESU. For the LCR steelhead ESU, NOAA (2000a) estimates that the median population growth rate over the base period (1990-1998) ranges from 0.98 to 0.78, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared with that of fish of wild origin (McClure *et al.* 2000).

UWR Steelhead

The UWR steelhead ESU occupies the Willamette River and tributaries upstream of Willamette Falls, extending to and including the Calapooia River. These major river basins containing spawning and rearing habitat comprise more than 12,000 km^2 in Oregon. Rivers that contain naturally-spawning winter-run steelhead include the Tualatin, Molalla, Santiam, Calapooia, Yamhill, Rickreall, Luckiamute, and Mary's, although the origin and distribution of steelhead in a number of these basins is being debated. Early migrating winter and summer steelhead have been introduced into the upper Willamette River basin, but those components are not part of the ESU. Native winter steelhead within this ESU have been declining since 1971, and have exhibited large fluctuations in abundance.

Over the past several decades, total abundance of natural late-migrating winter steelhead ascending the Willamette Falls fish ladder has fluctuated several times over a range of approximately 5,000 to 20,000 spawners. However, the last peak occurred in 1988, and this peak has been followed by a steep and continuing decline. Abundance in each of year from 1993 to 1998, was below 4,300 fish, and the run in 1995 was the lowest in 30 years.

In general, native steelhead of the UWR are late-migrating winter steelhead, entering freshwater primarily in March and April. This atypical run timing appears to be an adaptation for ascending Willamette Falls, which functions as an isolating mechanism for UWR steelhead. Reproductive isolation resulting from the falls may explain the genetic distinction between steelhead from the upper Willamette River basin and those in the lower river. UWR late-migrating steelhead are ocean-maturing fish. Most return at age 4, with a small proportion returning as 5-year-olds (Busby *et al.* 1996). Willamette Falls (River kilometer 77) is a known migration barrier (NOAA 2000a). Winter steelhead and spring Chinook salmon historically occurred above the falls, whereas summer steelhead, fall Chinook, and coho salmon did not. Detroit and Big Cliff Dams cut off access to 540 kilometer (km) of spawning and rearing habitat in the North Santiam River. In general, habitat in this ESU has become substantially simplified since the 1800s by removal of large woody debris to increase the river's navigability.

Habitat loss, hatchery steelhead introgression, and harvest are the major contributors to the decline of steelhead in this ESU. For the UWR steelhead ESU, the estimated median population growth rate for 1990 to 1998 ranged from 0.94 to 0.87, decreasing as the effectiveness of hatchery fish spawning in the wild increased compared with that of fish of wild origin (McClure *et al.* 2000).

UCR Steelhead

This inland steelhead ESU occupies the Columbia River basin upstream from the Yakima River to the U.S./Canada border. Rivers in the area primarily drain the east slope of the northern Cascade Mountains and include the Wenatchee, Entiat, Methow, and Okanogan River basins.

Estimates of historical (pre-1960s) abundance specific to this ESU are available from fish counts at dams (NOAA 2000a). Counts at Rock Island Dam from 1933 to 1959 averaged 2,600 to 3,700, suggesting a pre-fishery run size exceeding 5,000 adults for tributaries above Rock Island Dam (Chapman *et al.* 1994, Busby *et al.* 1996). Lower Columbia River harvests had already depressed fish stocks during the period in which these counts were taken, thus, the pre-fishery estimate should be viewed with caution.

Habitat degradation, juvenile and adult mortality in the hydropower system, and unfavorable environmental conditions in both marine and freshwater habitats have contributed to the declines and represent risk factors for the future. Harvest in lower river fisheries and genetic homogenization from composite broodstock collection are other factors that may contribute significant risk to the UCR steelhead ESU.

The median population growth rate over a base period from 1990 through 1998 ranged from 0.94 to 0.66, decreasing as the effectiveness of hatchery fish spawning in the wild increased compared with that of fish of wild origin (McClure *et al.* 2000). In 2002, 15,286 steelhead were counted at Rock Island Dam, compared with the 2001 count of 28,602, and the 10-year average return of 9,165. Of the total steelhead counted at Rock Island Dam in 2002, 10,353 were wild steelhead (Fish Passage Center 2003).

<u>LCR Coho Salmon</u>
The status of LCR coho salmon was initially reviewed by NOAA Fisheries in 1996 (NMFS 1996b) and the most recent review occur in 2001 (NMFS 2001a). In the 2001 review, the BRT was very concerned that the vast majority (over 90%) of the historical populations in the LCR coho salmon ESU appear to be either extirpated or nearly so. The two populations with any significant production (Sandy and Clackamas) were at appreciable risk because of low abundance, declining trends and failure to respond after a dramatic reduction in harvest. The large number of hatchery coho salmon in the ESU was also considered an important risk factor. The majority of the 2001 BRT votes were for ‘at risk of extinction’ with a substantial minority in ‘likely to become endangered.’

New analyses include the tentative designation of demographically independent populations, the recalculation of metrics reviewed by previous BRTs with additional years of data, estimates of median annual growth rate under different assumptions about the reproductive success of hatchery fish, a new stock assessment of Clackamas River coho by the ODFW (Zhou and Chilcote 2003), and estimates of current and historically available kilometers of stream.

As part of its effort to develop viability criteria for LCR salmon and steelhead, the Willamette/Lower Columbia Technical Recovery Team has identified historically demographically independent populations of ESA-listed salmon and steelhead in the Lower Columbia River (Myers *et al.* 2002). Population boundaries are based on an application of Viable Salmonid Populations definition (McElhany *et al.* 2000). Based on the Willamette Lower Columbia Technical Review Team’s framework for chinook and steelhead, the BRT tentatively designated populations of LCR coho salmon. A working group at the Northwest Fisheries

Science Center hypothesized that the LCR coho salmon ESU historically consisted of 23 populations.

Previous BRT and ODFW analyses have treated the coho in the Clackamas River as a single population (see previous status review updates for more complete discussion and references). However, recent analysis by ODFW (Zhou and Chilcote 2003) supports the hypothesis that coho salmon in the Clackamas River consist of two populations, an early run and a late run. The late run population is believed to be descendant of the native Clackamas River population, and the early run is believed to descend from hatchery fish introduced from Columbia River populations outside the Clackamas River basin. The population structure of Clackamas River coho is uncertain, therefore, in the BRT (2003) report, analyses on Clackamas River coho are conducted under both the single population and two population hypotheses for comparison.

The paucity of naturally-produced spawners in this ESU can be contrasted with the very large number of hatchery-produced adults. Although the scale of the hatchery programs, and the great disparity in relative numbers of hatchery and wild fish, produce many genetic and ecological threats to the natural populations, collectively these hatchery populations contain a great deal of genetic resources that might be tapped to help promote restoration of more widespread naturally-spawning populations.

The status of the LCR coho salmon ESU was reviewed by the BRT in 2000, so relatively little new information was available. A majority (68%) of the likelihood votes for LCR coho salmon fell in the 'danger of extinction' category, with the remainder falling in the 'likely to become endangered' category. As indicated by the risk matrix totals, the BRT had major concerns for this ESU in all VSP risk categories (risk estimates ranged from high risk for spatial structure/connectivity and growth rate/productivity to very high for diversity). The most serious overall concern was the scarcity of naturally-produced spawners throughout the ESU, with attendant risks associated with small population, loss of diversity, and fragmentation and isolation of the remaining naturally-produced fish. In the only two populations with significant natural production (Sandy and Clackamas), short- and long-term trends are negative and productivity (as gauged by preharvest recruits) is down sharply from recent (1980s) levels.

<u>Generalized Fish Use in the Action Areas</u>

Based on migratory timing, listed salmon and steelhead species likely will be present in the action area during the proposed construction period. The action area serves as rearing and saltwater acclimation habitat for juvenile salmon and steelhead, and migration habitat from adult salmon and steelhead. Juvenile and adult steelhead migrate year-round, with peak smolt out-migration occurring May through June, and peak adult emigration occurring January through June. Juvenile and adult sockeye salmon migrate April through August, with peak smolt out-migration occurring May through June, and peak adult emigration occurring June through July. Juvenile and adult Chinook salmon migrate year-round, with peak smolt out-migration occurring March through July, and peak adult emigration occurring March through October. Juvenile and adult chum salmon migrate October through May, with peak smolt out-migration occurring March through May, and peak adult emigration occurring October through November. Juvenile and adult coho salmon migrate April through November, with peak smolt out-migration occurring March through May, and peak adult emigration occurring September through October.

Critical Habitat

NOAA Fisheries designates critical habitat based on physical and biological features that are essential to the listed species. For this Opinion, NOAA Fisheries has designated critical habitat for SR sockeye salmon, SR spring/summer Chinook salmon, and SR steelhead for the Svensen Island proposal. The essential features of designated critical habitat within the action area that support successful spawning, incubation, fry emergence, migration, holding, rearing, and smoltification for ESA-listed salmonid fishes include: (1) Substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (primarily juvenile), (8) riparian vegetation, (9) space, and (10) safe passage conditions.

2.1.2 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR 402.02 (the consultation regulations). In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps of the consultation regulations and when appropriate combines them with its Habitat Approach (NOAA Fisheries 1999): (1) Consider the biological requirements of the listed species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; and (4) determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species. If so, step 5 occurs. In step 5, NOAA Fisheries may identify reasonable and prudent alternatives for the action that avoid jeopardy, if any exist.

The fourth step above requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (*i.e.*, effects on essential habitat features). The second part focuses on the species itself. It describes the action's effects on individual fish–or populations, or both–and places these effects in the context of the evolutionarily significant unit (ESU) as a whole. Ultimately, the analysis seeks to answer the question of whether the proposed action is likely to jeopardize a listed species' continued existence.

2.1.3 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess to the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The biological requirements of a listed species are population characteristics necessary for salmon and steelhead to survive and recover to naturally-reproducing population levels, at which time protection under the ESA would become unnecessary. These requirements are best defined as the attributes associated with viable salmonid populations. Viable salmonid populations are populations that have a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time frame. The attributes associated with viable salmonid populations include adequate abundance, productivity (population growth rate), population spatial scale, and genetic diversity (McElhany *et al.* 2000). These attributes are influenced by survival, behavior and experiences throughout the life cycle and by all action affecting the species, and are therefore distinguished from the more specific biological requirements associated with the action area. However, it is important that the action-area effects be considered in the context of these species-level biological requirements when evaluating the potential for the species to survive and recover (*i.e.*, in the context of the full set of human activities and environmental conditions affecting the species). Biological requirements may also be described as characteristics of the habitat for actions that primarily affect survival through habitat pathways.

The current status of each species (Table 1) indicates that the species-level biological requirements currently are not being met for any of the ESUs considered in this consultation. This indicates that improvements in survival rates (assessed over the entire life cycle) will be needed to meet species-level biological requirements in the future. NOAA Fisheries will assess survival improvements necessary in the life stages influenced by the proposed action after considering the environmental baseline, which is specific to the area affected by the proposed action. For this consultation, the biological requirements are habitat characteristics that would function to support successful adult migration, juvenile rearing and migration, and smoltification (see Table 1 for references).

2.1.4 Environmental Baseline

To a significant degree, the risk of extinction for salmon and steelhead stocks in the Columbia River basin, including the Wallooskee River and the Lewis and Clark River watersheds, has increased because complex freshwater and estuarine habitats needed to maintain diverse wild populations and life histories have been lost and fragmented. Estuarine habitat has been lost or altered directly through diking, filling, and dredging, and also has been degraded through changes to flow regulation that affect sediment transport and salinity ranges of specific habitats within the estuary. Not only have salmonid rearing habitats been eliminated, but the connections among habitats needed to support tidal and seasonal movements of juvenile salmon have been severed.

The Columbia River estuary lost approximately 43% of its tidal marsh (from 16,180 acres historically to 9,200 acres today), and 77% of its historic tidal swamp habitats (from 32,020 acres historically to 6,950 acres today) between 1870 and 1970 (Thomas 1983). One example is the diking and filling of floodplains that were formerly connected to the tidal river. This practice eliminated large expanses of low-energy, off-channel habitat for salmon rearing and migrating during high flows. Similarly, diking of estuarine marshes and forested wetlands within the estuary removed most of these important off-channel habitats. Between 1917 and 1939, extensive areas of the Wallooskee River and the Lewis and Clark River were diked (Bischoff *et al*. 2000). Currently, estuarine wetlands in these watersheds represent less than 0.2% of the watershed (Bischoff *et al*. 2000).

Within the Columbia River estuary, diking, river training devices (*e.g.*, pile dikes, riprap), railroads, and highways have narrowed and confined the river to its present location. Historically, the action areas were a complex of salt marsh wetlands and low marsh/swamp/forested wetlands. The area is thought to have been largely converted to agricultural use in the early-to-mid 1900s. Land use is managed primarily for agricultural and rural residential land uses. These land management practices have altered the hydraulic and geomorphic characteristics of Elliot, Larson, and Barrett Sloughs, and Svensen Island resulting in a substantial loss of estuarine habitat that served an important freshwater/saltwater transition zone for salmonid fishes in the Columbia River basin. In the Columbia River estuary, remaining tidal marsh and swamp habitats are in a narrow band along the Columbia River and its tributaries' banks, and around undeveloped islands.

Physical barriers (*e.g.*, levees and tide gates) inhibit volitional use of Elliot, Larson, and Barrett Sloughs, and Svensen Island by salmon and steelhead, prevent off-channel habitat use, and may entrap fish in poor habitat. While conditions may allow beneficial fish use of Elliot, Larson, Barrett Sloughs, and Svensen Island during most seasons, high water temperatures may preclude use during summer. Land use and water control (*e.g.*, grazing, tide gates) within the drainage area for Elliot, Larson, Barrett Sloughs, and Svensen Island likely means the chemical and nutrient criteria are not properly functioning. The lack of fencing to prevent livestock access to Elliot, Larson, and Barrett Sloughs, and Svensen Island has degraded streambank conditions. Restriction of tidal inundation by water control structures, soil compaction due to grazing, and tiling of pastures has altered the natural drainage network and flow characteristics within Elliot, Larson, and Barrett Sloughs, and Svensen Island.

The existing baseline condition is not properly functioning for water temperature, chemical contamination/nutrients, physical barriers, off-channel habitat, streambank condition, peak and base flows, and drainage network. NOAA Fisheries concludes that not all of the biological requirements of the listed species within the action area are being met under current conditions. Based on the best available information on the subject species status, including population status, trends, and genetics, and the environmental baseline conditions within the action area, significant improvement in habitat conditions is needed to meet the biological requirements for the survival and recovery of the species.

2.1.5 Analysis of Effects

In step three of the jeopardy analysis, NOAA Fisheries examines the likely effects of the proposed action on the species and its habitat within the context of the species' current status and the existing environmental baseline. The analysis also takes into account the effects of actions that are interrelated or interdependent with the proposed action. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

NOAA Fisheries may use one, or both, of two independent techniques in assessing the effects of a proposed action. One technique considers effects in terms of how many listed salmon will be killed or injured during a particular life stage and gauge the effects of that take on population size and viability. Alternatively, the other technique uses a habitat approach, which considers the effects on the species' habitat requirements, such as water temperature, substrate composition, dissolved gas levels, structural elements, *etc*. The need to account for poorly understood exogenous effects necessitates that larger scale indicators of habitat condition be utilized in conjunction with these individual indicators of habitat condition. Where general relationships are understood (*e.g.*, degree of watershed disturbance and the condition of the aquatic environment), the use of watershed scale indicators are an important tool to evaluate the probability of effect.

The habitat approach analysis is especially useful for actions that alter the physical condition of the landscape because, while many cause and effect relationships between habitat quality and population viability are well known, they do not lend themselves to meaningful quantification in terms of fish numbers. Consequently, while the habitat effect analysis does not directly assess the effects of actions on population condition, the analysis indirectly considers this issue by evaluating existing habitat conditions in light of habitat conditions known to be conducive to salmon conservation. For the subject consultation, NOAA Fisheries will use the habitat effect analysis when evaluating potential effects to the subject species.

2.1.5.1 Effects of Proposed Actions

Fish may be killed, or more likely temporarily displaced, by in-channel work activities (Spence *et al.* 1996). Water control structures inherently affect physical and chemical conditions, and may affect biological conditions. The habitat functions affected by tide gates may include:

- Fish passage for adult and juvenile migrating salmonids.
- Estuarine water quality.
- Surface water hydrology and groundwater levels.
- Movement of woody debris.
- Natural flooding processes landward of the tide gate.
- Water temperature.
- Salinity gradient.
- Sediment transport regimes upstream and downstream from the tide gate.

Water Quality - Turbidity

Construction activities that occur in stream channels (*i.e.*, excavation, culvert removal and installation, pile installation, tide gate installation, placement of rock) are likely to temporarily increase in turbidity. Potential effects from project-related increases in turbidity on salmonid fishes include, but are not limited to: (1) Reduction in feeding rates and growth, (2) increased mortality, (3) physiological stress, (4) behavioral avoidance, (5) reduction in macroinvertebrate populations, and (6) temporary beneficial effects. Potential beneficial effects include a reduction in piscivorous fish/bird predation rates, enhanced cover conditions, and improved survival conditions.

Increases in turbidity can adversely affect filter-feeding macroinvertebrates and fish feeding. At concentrations of 53 to 92 parts per million (ppm) (24 hours) macroinvertebrate populations were reduced (Gammon 1970). Concentrations of 250 ppm (1 hour) caused a 95% reduction in feeding rates in juvenile coho salmon (Noggle 1978). Concentrations of 1200 ppm (96 hours) killed juvenile coho salmon (Noggle 1978). Concentrations of 53.5 ppm (12 hours) caused physiological stress and changes in behavior in coho salmon (Berg 1983). Similar responses can be expected for the subject salmonid species.

The proposed in-channel work is likely to increase turbidity upstream during incoming tides and downstream from the work area during outgoing tides. Increases in turbidity are attributable to ground disturbance activities that occur primarily below the MHHW elevation. Furthermore, in the event the elevations of retained Elliot, Larson, and Barrett Sloughs, waters are greater than the design elevation for the culvert inverts (0.0 feet MLLW) at the time of culvert-tide gate replacements, sluicing of the levee at the breach point may erode the levee until equilibrium is achieved or the connection ditch runs dry. These likelihood of these effects is similar for the Svensen Island proposal, but since the Corps did not provide any design specification the potential and magnitude of such effects is uncertain. The Corps has not proposed any work area isolation (*e.g.*, coffer dam) to reduce effects under that situation.

Increases in turbidity are likely to increase physiological stress, result in physical injury (*e.g.*, gill abrasion), and potentially displace rearing juvenile salmon and steelhead (Bisson and Bilby 1992). For Elliot, Larson, and Barrett Sloughs, all work would occur during the ODFW-recommended in-water work window of July 1 to September 15. For Svensen Island, in-water work would occur outside ODFW-recommended in-water work window of November 1 to February 28. While the listed species may be present during the proposed action, construction during July through mid-September allows better control of the work site and reduces the risk of storm or high flow damage that would likely increase the distribution and magnitude of any adverse effects to the species. Additionally, working during low-tide periods would reduce the amount of in-water work necessary to complete the project and minimize construction-related turbidity. Salmon rearing in the action area during construction may also be exposed to other stress factors such as elevated water temperatures that in combination with increases in turbidity, during a time of year when refugia is limited or unavailable, is likely to increase physiological stress and may temporarily displace rearing juveniles from a given action area.

The subject species are expected to exhibit avoidance behavior, though juveniles present in the action area may experience physical harm as a result of exposure to elevated turbidity, or physical injury, *e.g.*, gill abrasion.

Construction Effects

Construction activities that occur in or beside stream channels (*i.e.*, excavation, culvert removal and installation, pile installation, tide gate installation, placement of rock, vegetation removal, grading) are likely to result in fish being killed or injured, or more likely temporarily displaced, by in-water work activities. The proposed in-water work windows and tide elevation restrictions, and the proposed equipment operation conservation measures to operate all equipment from top-of-bank are likely to minimize, but not eliminate, adverse effects from construction activities in or beside stream channels; although there is some uncertainty due to limited details provided about tide elevation restrictions and erosion and pollution control conservation measures.

Ground Disturbance

Excavation required to remove and install new culverts and tide gates would remove existing vegetation that provides effective ground cover and minimize erosion from rainfall, increasing suspended sediment in the action areas. Effects of increased suspended sediment are likely to lead to effects similar to those described above under *Construction Activities*.

Pile Installation-Effects of Increases in Acoustic Energy

Pile driving can generate intense underwater sound pressure waves that may adversely affect fishes. These pressure waves can injure or kill fishes (Caltrans 2001; Longmuir and Lively 2001; Stotz and Colby 2001; J. Stadler, NOAA Fisheries, Washington Habitat Branch, pers. obs. 2002). Injuries associated directly with pile driving include rupture of the swimbladder and internal hemorrhaging (Caltrans 2001; Abbott and Bing-Sawyer 2002; Stadler, NOAA Fisheries, Washington Habitat Branch, pers. obs. 2002). Sound pressures 100 decibels (dB) above the threshold for hearing likely are sufficient to damage the auditory system in many fishes. Feist *et al.* (1992) reported sound pressure increased up to 25 db above ambient levels from pile driving, at a range of 1946 feet from the source at a depth of 5 feet. Analysis of the sound field at 1946 feet showed significant acoustic energy between 200 and 400 Hz, and sound levels were at least 20 dB above ambient levels.

The type and intensity of the sounds produced during pile driving depend on a variety of factors, including, but not limited to, the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water and the type and size of the pile-driving hammer. Sound pressures are positively correlated with the size of the pile, as more energy is required to drive larger piles. Hollow steel piles as small as 14 inches in diameter have been shown to produce sound pressures that can injure fish (Reyff 2003). Firmer substrates require more energy to drive piles, and produce more intense sound pressures. Sound attenuates more rapidly with distance from the source in shallow than in deep water (Rogers and Cox 1988).

Driving hollow steel piles with impact hammers produce intense, sharp spikes of sound which can easily reach levels that injure fishes. Vibratory hammers, on the other hand, produce sounds of lower intensity, with a rapid repetition rate. Sound waves or particles produced by impact hammers and those produced by vibratory hammers evoke different responses in fishes. When exposed to sounds which are similar to those of a vibratory hammer, fishes consistently displayed an avoidance response (Enger *et al*. 1993, Dolat 1997, Knudsen *et al*. 1997, Sand *et al*. 2000), and did not habituate to the sound, even after repeated exposure (Dolat 1997, Knudsen *et al*. 1997). Fishes may respond to the first few strikes of an impact hammer with a startle response. After these initial strikes, the startle response wanes and the fishes may remain within the field of a potentially-harmful sound (Dolat 1997). The differential responses to these sounds are due to the differences in the duration and frequency of the sounds.

Fishes respond to particle acceleration of 0.01 m/s^{-2} at infrasound frequencies. The response to infrasound is limited to the nearfield in relation to the source (< 1 wavelength), and the fish must be exposed to the sound for several seconds (Enger *et al*. 1993, Knudsen *et al*. 1994, Sand *et al*. 2000). Impact hammers, however, produce such short spikes of sound, with so little energy in the infrasound range, that fishes fail to respond to the particle motion (Carlson *et al*. 2001). Thus, impact hammers may be more harmful than vibratory hammers for two reasons: First, they produce more intense pressure waves, and second, the sounds produced do not elicit an avoidance response in fishes, which will expose them for longer periods to the harmful pressures.

While the Corps did not specify pile installation method, it is likely that a vibratory hammer would be used for pile installation, and installation likely would occur in soft substrates typical of sloughs and intertidal channels. Nonetheless, pile installation is likely to lead to effects similar to those described above.

Levee Repair - Riverbank Modification

Natural riparian and stream processes can be affected by streambank hardening (*e.g.*, riprap, rock revetments) (Bolton and Shellberg 2001). Bank hardening not only modifies the streambed and bank but, as its primary purpose, stops natural processes that maintain a functioning riparian stream system. Potential effects of bank hardening on riverine processes include stream channel simplification, altered hydraulic processes, constrainment of stream channels (reduced sinuosity), loss of native sediment recruitment, and elimination of shallow-water habitat.

As erosive forces affect different areas in a stream, and bank hardening occurs in response, the stream eventually may attain a continuous fixed alignment lacking habitat complexity (USACE 1977). Bank hardening may shift erosion points either upstream, due to headcutting, or downstream, due to transfer of stream energy. Bank hardening can also increase stream velocities, contributing to channel incision and streambank failure.

Although riprap can provide some habitat features used by salmonids, such as inter-rock space, increasing evidence shows that in comparison to natural banks, fish densities at rock riprap banks are reduced (Schmetterling 2001). This is true even when compared to actively eroding cut banks (Michny and Deibel 1986, Schaffter *et al.* 1983). The use of riprap either results in site characteristics that limit suitability for fish at various life stages (Beamer and Henderson 1998, Peters *et al.* 1998, Li *et al.* 1984, North *et al.* 2002), or perpetuates detrimental conditions that may restrict or limit fish production (Beamer and Henderson 1998, Li *et al.* 1984). Even when rock may contribute to habitat structure within an alluvial stream system, the beneficial biological response is of limited duration with greater variability (Schmetterling 2001, Beamer and Henderson 1998, Peters *et al.* 1998, Andrus *et al.* 2000). The use of riprap can disrupt flows, reduce food delivery and create difficult swimming for smaller fish (Michny and Deibel 1986, Schaffter *et al.* 1983). These effects can reduce the suitability of the habitat for salmonids, and reduce the likelihood that adverse effects from riprap can be mitigated over time.

The proposed levee repair likely would lead to effects on habitat functions similar to those described above, and similar to the effects described above under *Water Quality - Turbidity*.

<u>Tide Gate Operations</u>
The Corps provided little information on the operation of the proposed tide gates (*e.g.*, average daily period open, width of opening, water surface differentials, closure elevation, water velocities). The tide gates for Elliot, Larson, and Barrett Sloughs would be operated to close at a water elevation of +5.5 ft. Tide gate operations would prevent unrestricted fish access into and out of the subject sloughs for migrating and rearing salmon and steelhead to rearing habitat until a lowering the tide allows the tide gate to open, permitting passage. For Elliot, Larson, and Barrett Sloughs, the tide gates would have a slider door (*i.e.*, a small door on the tide gate that is mechanically operated by hand crank and regulates tidal exchange between the sloughs and the respective rivers) that would potentially permit some exchange of water, and potentially permit limited fish passage, when the tide gate is closed. During low flow periods, defined by the applicant as April through September, the slider doors would remain fully open during this period to permit exchange of tide waters in the respective sloughs. Effects, adverse or beneficial, associated with tide gate operations are speculative without a data set to evaluate. The Corps provided no information on slider door operations (*e.g.*, water volume, velocities, fish passage potential) and therefore its potential effectiveness cannot be evaluated. For Svensen Island, the Corps provided no information regarding tide gate design and operations.

Water temperature is likely to increase in Elliot, Larson, and Barrett Sloughs, and the agricultural drainage ditch on Svensen Island during high tide when the tide gates are closed. This will create a confined and relatively static body of water likely leading to increased water temperatures. Water temperature is a function of both external factors, such as solar radiation, air temperature, precipitation and base flows, and internal factors such as width-to-depth ratios, groundwater inputs, and hyporheic exchange (Poole and Berman 2001). The proposed tide gates could affect both sets of factors. Interruption of the natural flow regime with a tide gate would allow water to pool and become static in an open landscape fully exposed to solar radiation where it would otherwise continue flowing and remain connected with the river system. Preliminary results from temperature monitoring of sloughs with tide gates in Washington state indicate water temperatures are likely to increase throughout the year and can exceed lethal conditions (25°C) (EPA 2003) (NOAA Fisheries 2003).

Elevated water temperatures can increase the rate at which energy is consumed for standard metabolism (Fry 1971), and can cause depletion of energy reserves owing to increased respiratory demands, protein coagulation, and enzyme inhibition in adult salmon (Idler and Clemens 1959, Gilhousen 1980). Juvenile salmon exposed to constant water temperatures greater than 18°C are highly susceptible to disease, such as *Chondrococcus columnaris.* Susceptibility to disease is a function of concentration of columnaris organisms, length of exposure, and temperature (EPA 2001) as well as age of individual (increased age, increased resistance). Contagion of *C. columanaris* has been suspected during passage of salmon through fish ladders (Pacha 1961), and increased incidence may be a result of the creation of slow-moving waters (Snieszko 1964). Coho salmon exposed to *C. columnaris* had a rapidly increasing rate of infection with increase in water temperatures above 12.2°C (Fryer and Pilcher 1974). For coho salmon, infection frequency was low at 12.2°C (3%), but was 49% at 15°C, and rapidly jumped to 100% at water temperatures greater than 20.6°C.

Operations of the proposed tide gates likely would lead to water quality effects similar to those described above. The effects of increases in water temperature are likely to increase physiological stress in rearing juveniles. Increases in water temperature likely would decrease dissolved oxygen concentrations, compounding the effects on rearing juveniles. Juvenile salmon are likely to avoid waters with elevated temperatures and low dissolved oxygen concentrations, provide refugia exists. However, twice daily (due to tidal cycles) exposure to significant increases in temperature and decreases in dissolved oxygen concentrations may cause disorientation and long-term displacement of some rearing salmon from the sloughs due to tide gate operations. This may reduce salmon and steelhead fitness and survival.

Available physical data for the Svensen Island proposal indicates that the agricultural drainage ditch and surrounding land is highly degraded, *i.e.*, converted intertidal wetlands to rangeland, little riparian vegetation, high water temperatures, high nutrient levels, channelized and leveed streams, and provides little to no fisheries use or potential use under existing land management practices (see consultation materials). Furthermore, the culvert-tide gate empties into a 500+ foot long, man-made, rip rapped conveyance ditch that exports agricultural runoff into the Columbia River[2]. Based on existing physical habitat and water quality conditions in the agricultural drainage ditch and current land management practices on Svensen Island, NOAA Fisheries prefers that until land management practices and physical habitat water quality conditions change in a manner that would benefit our trust resources, the tide gate be designed in a manner that will minimize the potential, to the extent practicable, for fish passage into the agricultural drainage ditch behind the proposed tide gate.

Although the proposed action is likely to improve fish passage and water quality in Elliot, Larson, and Barrett Sloughs when the tide gates are fully open and tidal exchange is unrestricted, too many physical and chemical habitat factors remain uncertain to determine whether habitat conditions would meet the biological and behavioral requirements of listed salmon and steelhead

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[2] Phone conservation between Karla Ellis, U.S. Army Corps of Engineers, and Robert Anderson, NOAA Fisheries, June 29, 2004.

when the tide gates are closed. The proposal to keep the slider doors fully open during April through September is likely to minimize adverse water quality effects during this period by providing some tidal exchange minimizing the potential for increased water temperature and decreased dissolved oxygen. During the period of October through March when the tide gates and slider doors are closed, adverse water quality effects are likely, although the probability and intensity of effect on ESA-listed fish is likely to be low due to increased precipitation, increased river discharge, and cooler ambient temperatures.

No design or operation specifications for the Svensen Island proposal were provided. Therefore, in the absence of definitive information, NOAA Fisheries draws the biologically conservative conclusion that the subject species likely would continue to be adversely affected by degraded water quality with adverse effects similar to those described above. While some fish may successfully pass through the culvert-tide gate into the agricultural drainage ditch, the probability of successful fish passage is extremely low due to the 500+ foot long rip rapped conveyance ditch that precedes the tide gate, and the small size of the culvert (36 inch diameter) which is likely to have high velocities during the time when the tide gate is open decreasing the probability of successful fish passage. Therefore, while some ESA-listed fish may enter the agricultural drainage ditch, the probability of successful fish passage is extremely low.

<u>Water Quality - Potential Spills</u>
Operation of heavy equipment requires the use of fuel, lubricants, coolants, *etc.*, which if spilled into a waterbody could injure or kill aquatic organisms. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain harmful polycyclic aromatic hydrocarbons. The proposed action includes a spill containment and control conservation measure; however, the Corps provided no details of the plan and therefore its potential effectiveness cannot be evaluated.

2.1.5.2 Effects on Critical Habitat

NOAA Fisheries designates critical habitat based on physical and biological features that are essential to the listed species. Essential features of designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage. Effects to critical habitat from these categories would be similar to the effects described above in section 2.1.3.

2.1.5.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation."

NOAA Fisheries is not aware of any specific future non-federal activities within the action area that would cause greater effects to listed species than presently occurs. Between 1990 and 2000, the population of Clatsop County increased by 7.0%[3]. Thus, NOAA Fisheries assumes that future private and state actions will continue within the action area, increasing as population density rises. As the human population in the state continues to grow, demand for actions similar to the subject project likely will continue to increase as well. Each subsequent action may have only a small incremental effect, but taken together they may have a significant effect that would further degrade the watershed's environmental baseline and undermine the improvements in habitat conditions necessary for listed species to survive and recover.

2.1.6 Conclusion

The fourth step in NOAA Fisheries' approach to determine jeopardy is to determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of the species' survival and recovery in the wild. After reviewing the best available scientific and commercial information available regarding the current status of SR steelhead, UCR steelhead, MCR steelhead, UWR steelhead, LCR steelhead, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, UCR spring-run Chinook salmon, UWR Chinook salmon, LCR Chinook salmon, CR chum salmon, LCR coho salmon, and SR sockeye salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, NOAA Fisheries concludes that the action, as proposed, is not likely to jeopardize the continued existence of the species listed above in this paragraph, and is not likely to destroy or adversely modify designated critical habitat for SR fall-run Chinook salmon, SR spring/summer-run Chinook salmon, and SR sockeye salmon.

Our conclusion is based on the following considerations: (1) In-water construction [*i.e.*, culvert installation and removal (tide gates), pile installation, levee repair, rock placement] and its potential effects (*i.e.*, harassment of, injury to or killing of listed fish, temporary increases in turbidity) will occur at a time of year when abundance of juvenile salmon and steelhead is likely to be moderate to low; (2) the new tide gates will likely improve fish passage between Elliot, Larson, and Barrett Sloughs, and the Woallooskee River and Lewis and Clark River, respectively; (3) the new tide gate for the Svensen Island proposal is unlikely to lead to improved fish passage conditions, potentially minimizing long-term adverse water quality-related effects (*i.e.*, increase in water temperature and disease potential) in the agricultural drainage ditch to ESA-listed fish; (4) the adverse effects of construction are likely to be short term, and are not likely to worsen existing conditions in the action areas; and (5) the proposed actions will not appreciably diminish reproduction, numbers, or distribution of ESA-listed species subject to this consultation.

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[3] U.S. Census Bureau, State and County Quickfacts: Clatsop County, Oregon. Available online at http://quickfacts.census.gov/qfd/states/41/41007.html

2.1.7 Reinitiation of Consultation

This concludes formal consultation on these actions in accordance with 50 CFR 402.14(b)(1). Reinitiation of consultation is required: (1) If the amount or extent of incidental take is exceeded; (2) the action is modified in a way that causes an effect on the listed species that was not previously considered in the biological assessment and this Opinion; (3) new information or project monitoring reveals effects of the action that may affect the listed species in a way not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

2.1.8 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitats, or to develop additional information. The following conservation recommendation is consistent with these obligations, and therefore should be carried out by the Corps for the proposed action:

1. When planning for future installation or replacement of water control structures, the Corps should apply the most recent version of NOAA Fisheries' Anadromous Salmonid Passage Facility Guidelines and Criteria.[4] This document provides criteria, rationale, guidelines and definitions for the purpose of designing proper fish passage facilities for the safe, timely and efficient upstream and downstream passage of anadromous salmonids at impediments created by man-made structures, natural barriers (where provision of fish passage is consistent with management objectives), or altered instream hydraulic conditions. The information needs for the completion of ESA consultation on such actions can be largely met by following the guidance provided in the document.

To be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed salmon and their habitats, NOAA Fisheries requests notification of any actions leading to the achievement of the conservation recommendation.

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonid fishes by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." [16 USC 1532(19)] Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act

[4] Available at URL: http://www.nwr.noaa.gov/1hydrop/hydroweb/docs/Passagecriteria.extrevdraft.pdf.

may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102] Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3] Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." [50 CFR 402.02] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

2.2.1 Amount or Extent of Take

NOAA Fisheries anticipates that the proposed action covered by this Opinion is reasonably certain to result in incidental take of listed species due to changes in water quality, and in-water construction. Effects of actions such as on the listed species these are unquantifiable in the short term, but are expected to be limited to harm in the form of habitat modification.

Therefore, even though NOAA Fisheries expects some low level of incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take to the species themselves. In instances such as this, NOAA Fisheries designates the expected level of take in terms of the extent of take allowed. NOAA Fisheries limits the area of allowable incidental take from construction-related activities that occur within an area measuring 300 feet from each culvert-tide gate in Elliot, Larson, and Barrett Sloughs, and the culvert-tide gate/levee repair on Svensen Island. Incidental take occurring due to modifications to the proposed actions, that occur beyond the action areas described in this Opinion, or that results from tide gate operations different from the specifications in the terms and conditions of this Opinion, are not authorized by this consultation.

2.2.2 Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize take of the above species from implementation of the proposed action. The Corps shall:

1. Minimize incidental take from general construction by applying conditions to the proposed action that avoid or minimize adverse effects to water quality, riparian, and aquatic systems.

2. Ensure completion of a comprehensive monitoring and reporting program to confirm this Opinion is meeting its objective of minimizing take from the proposed action.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. These terms and conditions are non-discretionary.

1. To implement reasonable and prudent measure #1 (construction), the Corps shall ensure that:

    a. Timing of in-water work. All inwater work will be completed between July 15 and September 15, and all culvert removal and installation, pile driving, and levee repairs will be completed during low tides of -1.0 feet or greater as predicted for Astoria, Oregon, unless otherwise approved in writing by NOAA Fisheries.

    b. Cessation of work. Project operations will cease under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

    c. Pollution Control Plan. A pollution control plan is prepared and carried out for each project to prevent pollution related to construction operations. The plan must contain the elements listed below, meet requirements of all applicable laws and regulations, and be available for inspection on request by NOAA Fisheries.

        i. A description of any hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.

        ii. A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

        iii. A description of turbidity control measures.

    d. Preconstruction activity. Before significant[5] alteration of the project area, the following actions must be completed:

        i. Emergency erosion controls. Ensure that the following materials for emergency erosion control are onsite:

            (1) A supply of sediment control materials (e.g., silt fence, straw bales[6]).

            (2) An oil-absorbing, floating boom whenever surface water is present.

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[5] "Significant" means an effect can be meaningfully measured, detected or evaluated.

[6] When available, certified weed-free straw or hay bales must be used to prevent introduction of noxious weeds.

ii. Temporary erosion controls. All temporary erosion controls must be in-place and appropriately installed downslope of project activity within the riparian area until site restoration is complete.

e. Heavy Equipment. Use of heavy equipment is restricted as follows.

i. Vehicle staging. Vehicles must be fueled, operated, maintained, and stored as follows.

(1) Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a vehicle staging area placed 150 feet or more from any stream, wetland, and mean higher high water (MHHW).

(2) Axillary fuel tanks stored at staging areas must have containment measures in place at all times.

(3) All vehicles operated within 150 feet of any stream, waterbody, wetland, or MHHW must be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected must be repaired in the vehicle staging area before the vehicle resumes operation. Inspections must be documented in a record that is available for review on request by NOAA Fisheries.

(4) All heavy equipment will be operated from top-of-bank.

ii. Stationary power equipment. Any stationary power equipment (e.g., generators, cranes) operated within 150 feet of any stream, waterbody, wetland, or MHHW must be diapered to prevent leaks, unless otherwise approved in writing by NOAA Fisheries.

f. Tide gates.

i. The tide gates for Elliot Slough, Larson Slough, and Barrett Slough shall maintain an opening of at least 1.5 feet until incoming tides are at an elevation of +5.5 feet or greater, and shall remain open for the full out-going tide cycle.

ii. The tide gates for Elliot, Larson, and Barrett Sloughs shall have a maximum water surface drop at the entrance and exit of the culvert-tide gates that does not exceed 0.5 feet throughout the tidal cycle/river stage.

iii. The tide gate velocities for Elliot, Larson, and Barrett Sloughs do not exceed 1 foot^{-1} second from March 1 through September 30 of a given year. From October 1 through February 28, culvert-tide gate velocities shall not exceed 5 feet^{-1} second.

iv. The tide gate for Svensen Island shall be a top-hinged flap-gate.

v. The culvert invert for Svensen Island shall be set at -2 MLLW or higher.

g. Earthwork. Earthwork (including excavation, dredging, filling and compacting) will be completed as quickly as possible.

i. Site stabilization. All disturbed areas must be stabilized, including obliteration of temporary roads, within 12 hours of any break in work unless construction will resume work within 7 days between June 1 and September 30, or within 2 days between October 1 and May 31.

ii. Source of materials. Boulders, rock, woody materials and other natural construction materials used for the project must be obtained outside the riparian area.

h. Site restoration. All streambanks, soils and vegetation disturbed by the project, including the 160-foot section of the levee, are cleaned up and restored as follows.

i. Revegetation. Areas requiring revegetation must be replanted before the first April 15 following construction with native woody species, e.g., Sitka spruce, black cottonwood, western red cedar, coast willow, and twinberry.

ii. Pesticides. No pesticide application is allowed, although mechanical or other methods may be used to control weeds and unwanted vegetation.

iii. Fertilizer. No surface application of fertilizer may occur within 50 feet of any stream channel.

2. To implement reasonable and prudent measure #2 (monitoring), the Corps shall:

a. Implementation monitoring. Submit a monitoring report to NOAA Fisheries within 120 days of project completion describing the Corps' success meeting these terms and conditions. The monitoring report will include the following information.

i. Project identification.

(1) Project name.

(2) Corps contact person.

(3) Starting and ending dates for work completed.

(4) Photo of habitat conditions at the project site, before, during, and after project completion.[7]

(a) Include general views and close-ups showing details of the tide gates, levees, and general project area, including pre and post construction.

(b) Label each photo with date, time, project name, photographer's name, and a comment about the subject.

(c) Photo stations shall be established for the new tide gates that permits tide gate operations to be fully documented.

(d) Photo-documentation of the tide gates shall be taken at high and low tides, and a range of intermediate out-going tides, to demonstrate tide gate operation effectiveness. Photo-documentation shall be taken over a period of 1 year representing year-round operations and environmental conditions.

[7] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the project area, and upstream and downstream of the project.

b. To assess water quality effects associated with tide gate operations, a continuous temperature recorder is installed at the deepest point in Elliot Slough, Larson Slough, and Barrett Sloughs.
   i. The temperature recorder shall be installed in a manner that it is secure and is not exposed during low tides.
   ii. Water temperature shall be measured continually for a period of 1 year following tide gate installation.
   iii. Water temperature shall be reported as daily minimum, daily maximum, and running 7-day average of the daily maximum for each week (*i.e.* per the protocol of the Oregon Department of Environmental Quality).
   iv. The water quality monitoring shall take place for a minimum of three years.
   v. <u>Work cessation</u>. Dates work cessation was required due to high flows, if any.
   vi. <u>Pollution and erosion control</u>. A summary of pollution and erosion control inspections, including any erosion control failure, hazardous material spill, and correction effort.
   vii. <u>Site preparation</u>. Total cleared area, riparian and upland.
   viii. <u>Tide gates</u>. An as-built diagram of each tide gate.
   ix. <u>Site restoration</u>.
      (5) Finished grade slopes and elevations.
      (6) Planting composition and density.
      (7) Confirmation that 80% revegetation survival or 80% plant coverage (including both plantings and natural recruitment) have been achieved, invasive non-native vegetation is under control, and plantings are protected from wildlife damage and other harm.

c. Submit monitoring report to:

NOAA Fisheries
Oregon State Habitat Office
Attn: 2004/00103
or
Attn: 2004/00343
525 NE Oregon Street, Suite 500
Portland, OR 97232-2778

d. NOTICE. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

Pursuant to the MSA:

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (§305(b)(4)(A)).

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). "Adverse effect" means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects on EFH.

3.2 Identification of EFH

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: Chinook (*O. tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC

1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). EEH also has been designated for groundfish species and coastal pelagic species. The estuarine EFH composite includes those waters, substrates and associated biological communities within bays and estuaries of the EEZ, from mean higher high water level (MHHW) or extent of upriver saltwater intrusion to the respective outer boundaries for each bay or estuary as defined in 33 CFR 80.1 (Coast Guard lines of demarcation). Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Casillas *et al.* (1998) provides additional detail on the groundfish EFH habitat complexes.

3.3 Proposed Action

The proposed action is detailed above in section 1.2 of this document. For this consultation, NOAA Fisheries defines the action area for the North Coast Watershed Association proposal to include all aquatic habitats accessible to the subject species in Elliot Slough, Larson Slough, Barrett Slough, Svensen Island (exclusive to Township 8 North, Range 8 West, section 15), and an area 300 feet on the downstream side of the tide gates (the Woallooskee River, the Lewis and Clark River, and the Columbia River, respectively). This area has been designated as EFH for various life stages of groundfish species, and Chinook and coho salmon (Table 2).

3.4 Effects of Proposed Action

The proposed action will adversely affect water quality for groundfish species, and Chinook and coho salmon due to temporary increases in turbidity, potential spills of toxic materials, and reduced water quality, *i.e.*, increased water temperature, lower dissolved oxygen, due to tide gate operations.

3.5 Conclusion

The proposed action may adversely affect the EFH for coastal pelagic species, groundfish species, and Chinook and coho salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. The conservation measures proposed for the project by the applicant and the terms and conditions described in the incidental take statement that is attached to the ESA biological and conference opinion for this project are all applicable to salmon EFH, except those relating to work timing, and the disposition of any individual fish killed or injured during completion of the project. With those exceptions, NOAA Fisheries incorporates those conservation measures and terms and conditions here as EFH conservation recommendations.

3.7 Statutory Response Requirement

Please note that the MSA (section 305(b)) and 50 CFR 600.920G) requires the Federal agency to provide a written response to NOAA Fisheries after receiving EFH conservation recommendations within 30 days of its receipt of this letter. This response must include a description of measures proposed by the agency to avoid, minimize, mitigate or offset the adverse effects of the activity on EFH. If the response is inconsistent with a conservation recommendation from NOAA Fisheries, the agency must explain its reasons for not following the recommendation.

3.8 Supplemental Consultation

The Corps must reinitiate EFH consultation with NOAA Fisheries if the action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

Table 2. Species with designated EFH in the estuarine EFH composite in the state of Oregon.

Groundfish Species	
Leopard Shark (southern OR only)	*Triakis semifasciata*
Soupfin Shark	*Galeorhinus zyopterus*
Spiny Dogfish	*Squalus acanthias*
California Skate	*Raja inornata*
Spotted Ratfish	*Hydrolagus colliei*
Lingcod	*Ophiodon elongatus*
Cabezon	*Scorpaenichthys marmoratus*
Kelp Greenling	*Hexagrammos decagrammus*
Pacific Cod	*Gadus macrocephalus*
Pacific Whiting (Hake)	*Merluccius productus*
Black Rockfish	*Sebastes maliger*
Bocaccio	*Sebastes paucispinis*
Brown Rockfish	*Sebastes auriculatus*
Copper Rockfish	*Sebastes caurinus*
Quillback Rockfish	*Sebastes maliger*
English Sole	*Pleuronectes vetulus*
Pacific Sanddab	*Citharichthys sordidus*
Rex Sole	*Glyptocephalus zachirus*
Rock Sole	*Lepidopsetta bilineata*
Starry Flounder	*Platichthys stellatus*
Coastal Pelagic Species	
Pacific Sardine	*Sardinops sagax*
Pacific (Chub) Mackerel	*Scomber japonicus*
Northern Anchovy	*Engraulis mordax*
Jack Mackerel	*Trachurus symmetricus*
California Market Squid	*Loligo opalescens*
Pacific Salmon Species	
Chinook Salmon	*Oncorhyncus tshawytcha*
Coho Salmon	*Oncorhyncus kisutch*

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